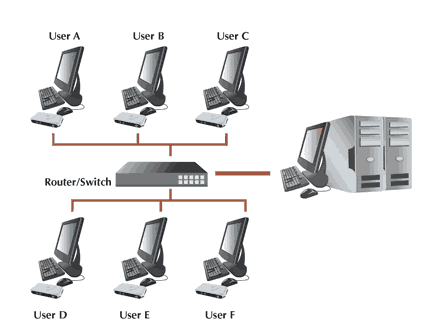
**Name: Enrico Delfinado Date:**

**Task 2 - Theory Assessment**

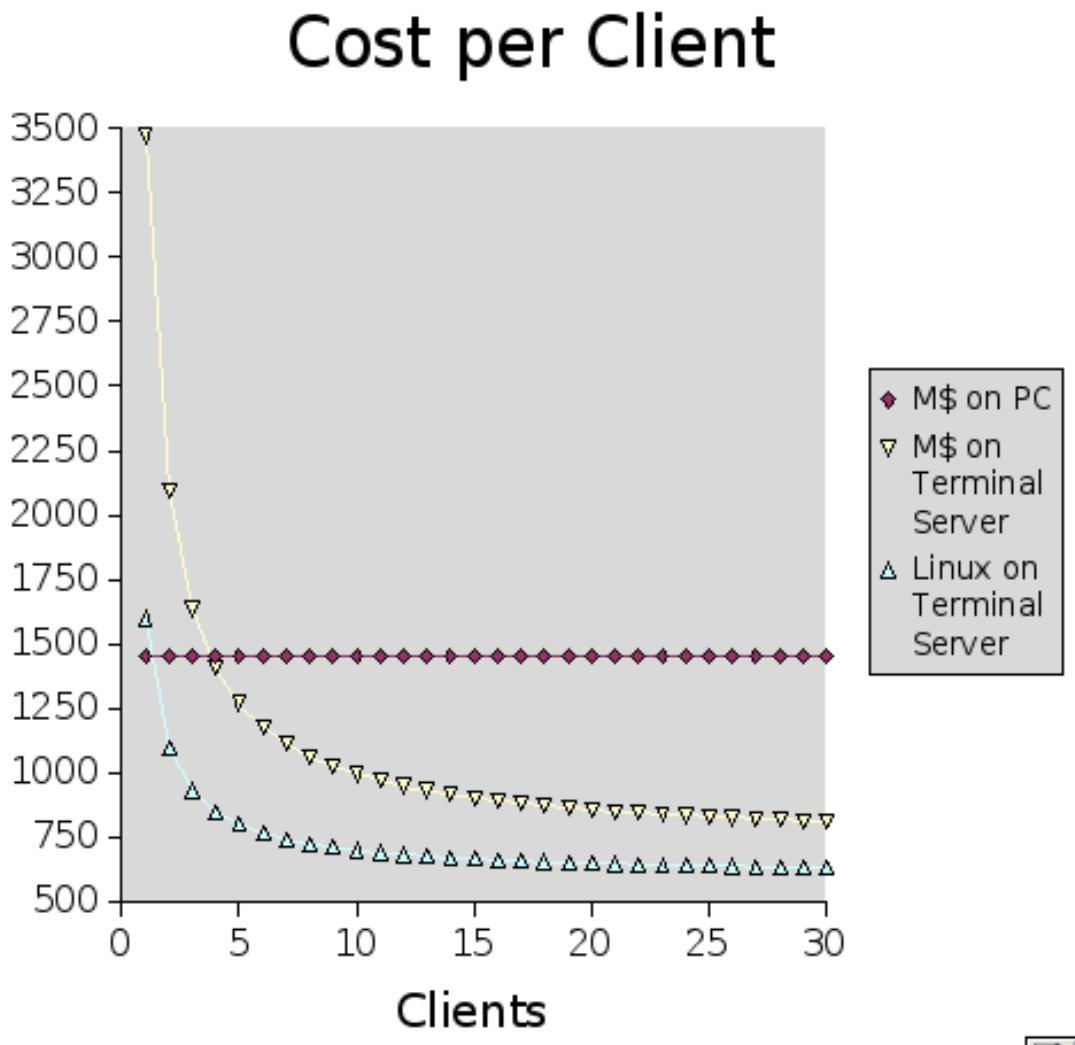
**Research and identify suitable technology solutions applicable to the project**

**Gather power consumption data on ICT equipment required for an energy audit based on an agreed standard**

**Thin Client Networks**



<http://www.ikon.is/ikon/content/view/114/52/lang,english/>



**Thin Client**

<http://en.wikipedia.org/wiki/Thin_client>

<http://www.lamarheller.com/technology/thinclient/powerstudy.pdf>

<http://net.educause.edu/ir/library/pdf/DEC0005.pdf>

A thin client (sometimes also called a lean or slim client) is a computer or a computer program which depends heavily on some other computer (its server) to fulfill its traditional computational roles. This stands in contrast to the traditional fat client, a computer designed to take on these roles by itself. The exact roles assumed by the server may vary, from providing data persistence (for example, for diskless nodes) to actual information processing on the client's behalf.

Thin clients occur as components of a broader computer infrastructure, where many clients share their computations with the same server. As such, thin client infrastructures can be viewed as the providing of some computing service via several user-interfaces.

Thin-client computing is also a way of easily maintaining computational services at a reduced total cost of ownership.

Name: Napoleon Bercasio Date:

**Theory (50Marks)**

Complete the following:

Questions (5 marks each)

1. Give an overview of thin client computing to your client.

ANSWER:

A **thin client** (sometimes also called a **lean** or **slim client**) is a [computer](http://en.wikipedia.org/wiki/Computer) or a [computer program](http://en.wikipedia.org/wiki/Computer_program) which depends heavily on some other computer (its *server*) to fulfill its traditional computational roles. This stands in contrast to the traditional [fat client](http://en.wikipedia.org/wiki/Fat_client), a computer designed to take on these roles by itself. The exact roles assumed by the server may vary, from providing [data persistence](http://en.wikipedia.org/wiki/Data_persistence) (for example, for [diskless nodes](http://en.wikipedia.org/wiki/Diskless_node)) to actual [information processing](http://en.wikipedia.org/wiki/Information_processing) on the client's behalf.

Thin clients occur as components of a broader computer infrastructure, where many clients share their computations with the same server. As such, thin client infrastructures can be viewed as the providing of some computing service via several user-interfaces. This is desirable in contexts where individual fat clients have much more functionality or power than the infrastructure either requires or uses. This can be contrasted, for example, with [grid computing](http://en.wikipedia.org/wiki/Grid_computing).[[1]](#footnote-1)

1. Explain the advantages of a thin client.

ANSWER:

### Cheap client hardware

With this kind of infrastructure the server must be robust enough to handle heavy transaction as all of the clients will rely on the performance. However client machine need not to be built with expensive peripherals as it only needs, keyboard, video mouse and a boot device without hard drive. This will reduce the power consumption of the entire system.

### Tighter Data Information and Lower Physical Security

All information resides in the server, no information are stored in the client machine. There is a lower risk of data/information leakage, inconsistencies and risk that device are stolen is lower considering the value and function of the client machine. Only the server need tighter security rather than securing every client machine.

### Lower licensing cost

We may agree that are available free productivity software available in the market today, but most business and commercial applications also requires licenses. Client access licenses however are a lot cheaper compared to individual application licenses. Most free software are for personal, small office and home office use, but when used in greater scale it already requires a paid version.

### Centralized management and easy maintenance

Helpdesk support and system management will be heavily on the server side thereby reducing he complexity of the support mechanism mostly handled through phone support. Troubleshooting will be a lot easier. Boot images with be lesser if the machines are identical thus footprints are lesser and will not be occupying a lot of storage space.

1. Explain the disadvantages of thin client.

ANSWER:

### Single point of failure

Since this is a centralized processing and the function of the client machine is to render the result of server side processing, the entire system will be not functional should the server fails. Higher downtime and high business impact in case of failure

### Heavy reliance of network connectivity

This kind of infrastructure heavily relies on network connectivity, thus server network device must be rubost enough and built with redundancy, load balancing, real time backup/recovery systems that will make the server infrastructure expensive.

### Client simplicity

Client machines are so simple that in only requires a boot device to connect to the server and it has only few peripherals that add up to the complexity of the entire system. In case of client failure, replacement can easily be done since no user data, configuration are stored locally thereby making it faster to resume operation.

### Slow bitmapped/animated graphics

Client machines are not equipped with high performance display cards to handle fast image processing. Heavy graphics applications and rendering are not suitable for this type of infrastructure. Although there are new models of thin clients optimized for higher resolution but then again it suffers much on thin client application. This limits the application of thin client to internet browsing, spreadsheet, data processing and word processing.

1. Explain alternative ways to setup thin client networks in GNU/Linux

ANSWER:

* + - 1. Linux Terminal Server Project
      2. Remote Desktop using freeRDP
      3. Desktop Virtualization

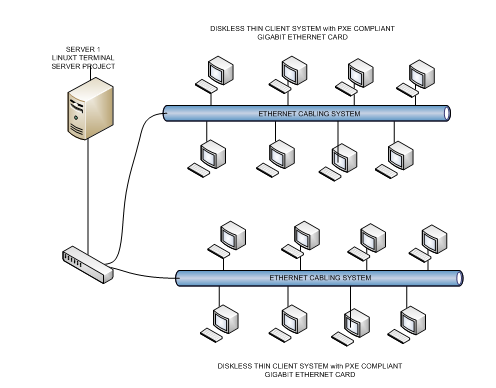
1. Recommend a Linux thin client solution for a small school classroom of 16 seats (clients)

ANSWER:

Thin Client computing

1. Sketch your solution

ANSWER:



1. Detail hardware:

ANSWER:

|  |  |  |
| --- | --- | --- |
| Item | Cost | URL |
| Thin client (16x249.00) | 249.00 | <http://store.disklessworkstations.com/200122.html> |
| KVM (16X200) | 3,200 | www.jb-hifi.com.au |
| Switch (1x24Ports netgear switch | 189.00 | www.netgear.com |
| Server | 1348.35 | <http://store.disklessworkstations.com/700001.html> |
| Cables (21x16.79) | 335.80 | http://www.ebay.com.au/itm/280866004935?hlp=false |
| Modem | 129.00 | www.jb-hifi.com.au |
| **TOTAL COST** | 5,451.15 |  |

1. Detail software:

ANSWER:

|  |  |  |
| --- | --- | --- |
| Item | Cost | URL |
| Ubuntu | Download Free | http://www.ubuntu.com/download |
| LTSP | Download Free | http://www.ltsp.org/download/ |
| **TOTAL COST** |  |  |

1. What is the expected performance of your solution?

ANSWER:

Client boot time:

Diskless thin client maybe slower than rich client in terms of booting time as it download some codes, os images from the server to the local machine.

Office apps installed:

Office applications are already installed on the server and user needs only to run whatever applications available on the server.

1. Explain the sustainability merits of thin client architectures

An LTSP thin client environment brings many benefits to an organization. Here are five reasons why you should choose LTSP:

1. Reduced Costs

In an LTSP thin client environment, all software for workstations originates on the LTSP server. Whether you are repurposing old desktop PCs or deploying new thin client devices, LTSP can be a key component in reducing the costs related to your computing environment.

2. No Licensing Fees

LTSP is open source software, released under the GPLv2 License. There is no cost to download and use LTSP. Benefitting from LTSP? Consider contributing to the project.

3. Less Maintenance Required

LTSP allows you to maintain your entire computer network from a single point of control; from the operating system image on the thin clients through user authentication and file storage. By reducing your software footprint with LTSP, maintenance and support obligations are reduced when compared to traditional desktop PC computing solutions.

4. Secure

Security has become a key challenge for administrators. LTSP thin client connections can be secured via SSH and are restricted to a LAN, ensuring that you are operating a manageable and safe computing environment. The LTSP model also makes it increasingly challenging for your systems to be a victim of viruses and spyware.

5. Community

The LTSP community has been active since 1999. Fueled by participation and experimentation, LTSP users have deployed LTSP in every imaginable scenario possible; from running an irrigation system to offering their company a thin client computing solution to replace desktop PCs. However you choose to LTSP, contributing back to the community is sure to improve your experience.

<http://www.ltsp.org/benefits/>

**Practicum (50Marks)**

* **Identify power consumption of a thin client system under different operating conditions using the Current Cost EnviR Energy Monitor and appropriate power lead or similar energy meter.**
* **Recommendations on upgrading computer system.**

1. Record power consumption and notes e.g. range, variability, operating conditions:

|  |  |  |
| --- | --- | --- |
| **Condition** | **Server power consumption**  **(watts)** | **Thin Client**  **consumption**  **(watts)**  **Model:** |
| **OFF** | 19 | 1 |
| **MAX BOOT** | 42 | 15 |
| **IDLE** | 42 | 5 |
| **Wordprocessing** | 42 | 5 |
| **Spreadsheets** | 44 | 5 |
| **Web browsing**  <http://news.bbc.co.uk/2/hi/programmes/click_online/default.stm> | 44 | 5 |
| **Low level music**  [http://grooveshark.com/#/s/Fall+At+Your+Feet/3KIZB0?src=5](http://grooveshark.com/) | 44 | 5 |
| **Low level video** <http://news.bbc.co.uk/2/hi/programmes/click_online/8610962.stm> | 44 | 5 |
|  |  |  |

1. Evaluate the extent to which sustainability could be integrated into an upgrade of the computer system.

|  |  |  |
| --- | --- | --- |
|  | Thin Client | Desktop |
| Max Boot | 11 | 22 |
| 20 Units | 120 Watts | 240watts |

Advise your recommendations:

Based on individual per unit reading of computers it can be linearly calculated to provide comparison between thin client and desktop computer. As shown in the computation desktop draws twice more power as that of the thin client.

1. <http://en.wikipedia.org/wiki/Thin_client> [↑](#footnote-ref-1)